

A Revision of the Japanese Species of the Subfamily Reduviinae (Insecta: Heteroptera: Reduviidae)

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The Japanese assassin bugs of the subfamily Reduviinae are revised. Six species in four genera are recognized, including two new species, *Reduvius yaeyamanus* and *Tiarodes miyamotoi*, both from Ishigaki Island and Iriomote Island in the Ryūkyū Islands. The four previously known species are diagnosed. A key is given for the separation of the Japanese genera and species of the Reduviinae.

Key Words: Heteroptera, Reduviidae, Reduviinae, assassin bugs, *Acanthaspis*, *Penegrinator*, *Reduvius*, *Tiarodes*, new species, Japan.

Introduction

The Reduviinae represent the second largest subfamily in the assassin bug family Reduviidae, comprising more than 980 valid species in approximately 140 genera from all zoogeographical regions (Maldonado Capriles 1990). This subfamily is characterized mainly by the presence of a pair of ocelli, the lack of a discal cell in the corium, three-segmented tarsi, and the presence of a fossula spongiosa on each tibia of the fore- and midlegs.

Among the Japanese Reduviinae *Acanthaspis humeralis* Scott, 1874 (currently *Reduvius humeralis*) was the first to be recorded (Scott 1874). Subsequently, three species, *Acanthaspis cincticrus* Stål, 1859, *Reduvius decliviceps* Hsiao, 1976, and *Peregrinator biannulipes* (Montrouzier and Signoret, 1861) were added to the fauna by Matsumura (1931), Miyamoto (1977), and Takahashi and Romero (2001), respectively.

Two further species belonging to the genera *Reduvius* and *Tiarodes* have recently been discovered in the Ryūkyū Islands, southern Japan, and are described below as new species, *Reduvius yaeyamanus* and *Tiarodes miyamotoi*. On this occasion, the four previously known species are revised, with supplemental accounts and, when necessary, illustrations of their morphology, particularly the male genitalia. A key to the Japanese genera and species is also given.

Materials and Methods

Male and female genitalia were soaked in hot 10% KOH solution for about five minutes, and the endosoma of the male genitalia was pulled out of the phallosoma with forceps. Observations were made under stereoscopic microscopes (Olympus SZH10 and SZ60) and a compound microscope (Olympus CH2). Illustrations were drawn using the stereoscopic microscopes, with the aid of an eyepiece grid and/or a drawing tube. After observations, genitalia were preserved in small glass tubes with glycerin.

Depositories of the types and the other specimens are abbreviated as follows: CAU—Department of Entomology, China Agricultural University, Beijing, China; ELEU—Entomological Laboratory, College of Agriculture, Ehime University, Matsuyama, Japan; KUEC—Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan; KURA—Kurashiki Museum of Natural History, Kurashiki, Japan; NIAES—Laboratory of Insect Systematics, National Institute of Agro-Environmental Science, Tsukuba, Japan; NSMT—Department of Zoology, National Science Museum, Tokyo, Japan; OMM—Omogo Mountain Museum, Ehime, Japan; TUA—Laboratory of Insect Resources, Faculty of Agriculture, Tokyo University of Agriculture, Atsugi, Japan. For the known species, new distributional records within Japan are indicated by an asterisk (*) at each listed new locality.

Taxonomy

Genus *Acanthaspis* Amyot and Servile, 1843

Acanthaspis cincticrus Stål, 1859

[Japanese name: Hari-sashigame]

Acanthaspis cincticrus Stål, 1859: 188; Fukui 1927: 2; Ishihara 1937: 728; Ookubo 1937: 339; Esaki 1956: 246; Miyamoto 1965: 93; Tomokuni and Cai 2002: 106.

Acanthaspis humeralis [not Scott, 1874]: Matsumura 1905: 27.

Acanthaspis albovittata Matsumura, 1907: 141. [Synonymized by Matsumura 1931: 1206]

This species is characterized in having the head and anterior pronotal lobe uniformly black, the humeri spinosely projecting, no pair of spines on the disc of the posterior pronotal lobe, two pale annulations on the tibiae, a pale, apically curved, longitudinal stripe on the corium, and the laterotergites II to VI pale posteriorly. Wing dimorphism is recognized very often, the fully winged form appearing generally in the male and the brachypterous form in the female. The body length ranges from 14.5 to 16.0 mm.

Material examined (m, macropteraous; b, brachypterous). **Japan.** [Kanagawa Pref.] Kôzu, Odawara, 1♂ (m), 29.x.1950, H. Hasegawa (NIAES). [Gifu Pref.] Hashima, 1♀ (b), 24.viii.1943 (NIAES). [Wakayama Pref.] Mt. Ryûmon-zan, 1♀ (b), 18.ix.1944, S. Gotoh (TUA); *ditto*, 1♂ (m), 1♀ (b), 2.ix.1952, S. Gotoh (TUA); Yuasa Town, 1♂ (m), 20.ix.1960, Y. Kusui (TUA). [Hyôgo Pref.] Mt. Maya-san, Kôbe, 3♂ (b), 2♀ (b), 30.vii.1964, M. Nishikawa (TUA); Takatori, Kôbe, 1♀ (b), 12.viii.1949, E.

Nakanishi (NIAES); *ditto*, 1♂ (m), 18.viii.1949, E. Nakanishi (NIAES); *ditto*, 2♂ (m), 25.vii.1950, E. Nakanishi (NIAES). [Hiroshima Pref.] Nikô, Kure, 1♀ (b), 27.x.1935, T. Ishihara (NIAES); *ditto*, 1♀ (b), 4.ix.1936, T. Ishihara (ELEU); *ditto*, 1♀ (b), 23.ix.1936, T. Ishihara (ELEU); *ditto*, 1♀ (b), 3.viii.1940, T. Ishihara (ELEU); *ditto*, 1♂ (m), 10.viii.1940, T. Ishihara (ELEU); Hiroshima, 1♂ (m), 28.viii.1953, T. Ishihara (ELEU); *ditto*, 1♀ (m), 10.ix.1955, T. Ishihara (ELEU); In-no-shima Island, 1♀ (b), 22.ix.1972, M. Sakai (ELEU). [Kagawa Pref.] Yo-shima Island, 1♀ (b), 26–27.x.1973, T. Kinoshita (ELEU); Nakasuji, Ôchi Town, 1♂ (m), 4–5.ix.1993, K. Aita (OMM). [Ehime Pref.] Dôgo, Matsuyama, 1♀ (b), 21.ix.1946, T. Yano (ELEU); *ditto*, 1♂ (b), 21.ix.1946, T. Yano (ELEU); Shibukusa, Omogo Village, 1♀ (b), 19.viii.2002, H. Tanabe (ELEU); *ditto*, 1♀ (b), 18.ix.2003, S. Yano (OMM); Shigenobu Town, 1♂ (m), 6.ix.1988, M. Sakai (NSMT). **China.** [Beijing] Mt. Dazhao, 1♂ (m), 7.viii.1948, Yang Chi-kun (CAU).

Distribution. Japan [Hokkaidô (Matsumura 1905), Honshû (Matsumura 1905; present study), Shikoku (Ookubo 1937; present study), Kyûshû (Matsumura 1905)], Korea (Doi 1933), N and SE China (Reuter 1887; present study), Myanmar [Yangon (Stål 1874)], India [Assam (Stål 1859)].

Remarks. In general appearance this species closely resembles *Acanthaspis fuscinervis* Hsiao, 1976 (*q.v.*), known from China, but can be distinguished by the lack of pale circular markings on the posterior pronotal lobe (in *A. fuscinervis*, with four pale circular markings arranged transversely) and by the pale, apically curved, longitudinal stripe on the corium of each hemelytron (vs. a pale, irregular marking on the apical part of the corium).

Biology. Despite being widely distributed in Asia, this species is one of the rarest reduviids in Japan, and our knowledge of its biology is, therefore, still insufficient. It is a ground dweller on sunny, dry lands covered with sparse vegetation (Ishihara 1937; Tanabe and Yano 2004). Tanabe and Yano (2004) also noted a relatively rich diversity of ant species in such habitats. It is well known that the nymphs of this species feed exclusively on ants and carry ants' corpses on their back (Ishihara 1937; Esaki 1956; Miyamoto 1965; Tanabe and Yano 2004). According to Ishihara (1937), adults appear in late August in Hiroshima Prefecture, western Honshû, and then increase in autumn. Tanabe and Yano (2004) collected newly emerged adults in late July to early August in a montane area of Ehime Prefecture, Shikoku.

Genus *Peregrinator* Kirkaldy, 1904

Peregrinator biannulipes (Montrouzier and Signoret, 1861)

[Japanese name: Kebuka-sashigame]

Opsicoetus biannulipes Montrouzier and Signoret, 1861: 69.

Microcleptes biannulipes: Stål 1867: 240.

Reduvius laniger A. G. Butler, 1876: 411. [Synonymized by Distant 1902: 181]

Alloeocranum biannulipes: Lethierry and Serevin 1896: 160.

Peregrinator biannulipes: Kirkaldy 1904: 280; Takahashi and Romero 2001: 93; Takahashi and Nishi 2003: 37.

This is the only known species of the genus *Peregrinator*. It is easily distin-

guished from other reduviine species by the long, dense, erect setae on the body and legs, the mandibular plates that strongly project anteriorly, antennal segment I being half as long as the head length, the presence of two dark annulations on each femur and two dark spots on each corium, and the mostly black membranes of the hemelytra. The body length is about 6.5 mm.

Material examined. **Japan.** [Okinawa Is.] Jitchaku, Urasoe, 1♂, 1♀, 18.ii.1999, H. Ikenaga (TUA); Urasoe, collected in stored grain, 2♂, 1♀, 23.vi.1999, M. Takai and T. Yasunaga (NSMT). **China.** [Hainan] Baoting, 80 m alt., 1 ♂, 18.v.1962 (CAU).

Distribution. Japan [Okinawa Is. (Takahashi and Romero 2001; present study)], tropicopolitan (Stål 1867; Distant 1904; Villiers 1948; Hsiao and Ren 1981; and others).

Remarks. Takahashi and Romero (2001) first recorded this small reduviid from Japan based on several specimens found in the storage bin of a flour mill in Okinawa, the Ryūkyū Islands. They considered it to be an invader accidentally introduced from Thailand with rice. It has not yet been found under natural conditions in Japan.

Biology. This species is a well-known predator of stored product pests such as *Stegobium paniceum* (Linnaeus, 1761) and *Lasioderma serricorne* (Fabricius, 1792), both of the coleopteran family Anobiidae (Tawfik *et al.* 1983; Awadallah and Afifi 1990); however, little has been known about the biology of this species under natural conditions. Wygodzinsky and Usinger (1960) recorded ten males collected from rotten aquatic plants in Guam, but they mentioned nothing about the biology. According to field observations in Thailand and Palau by Takahashi and Nishi (2003), adults and nymphs were found chiefly under the bark of dead trees together with a number of beetles of the families Cucujidae, Tenebrionidae, and Staphylinidae. They considered that these Coleoptera might be prey of the reduviid in the field.

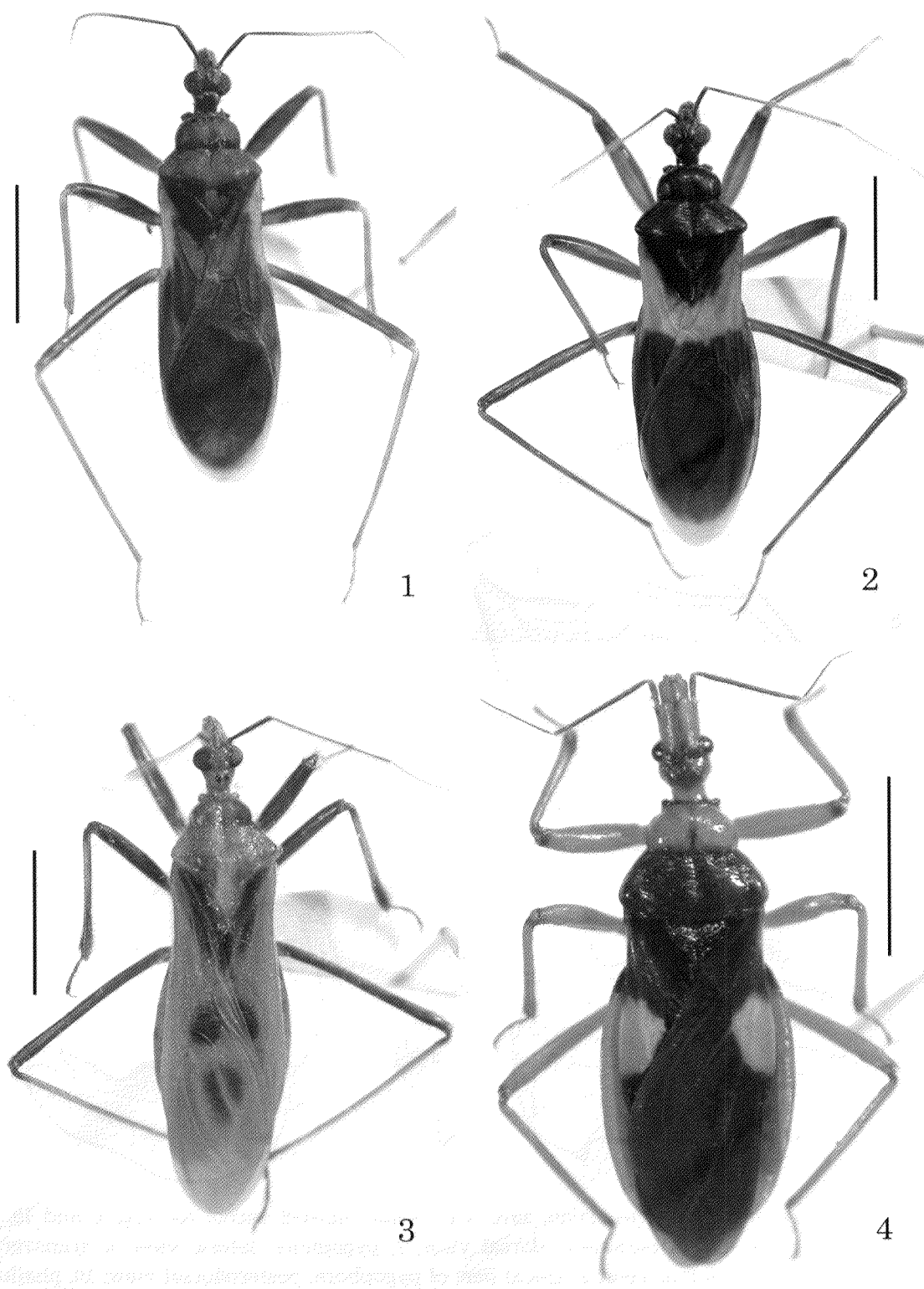
Genus *Reduvius* Fabricius, 1775
Reduvius decliviceps Hsiao, 1976
 [Japanese name: Chairō-sashigame]
 (Figs 1, 2, 5–11)

Reduvius sp.: Hasegawa 1960: 46.

Reduvius decliviceps Hsiao, 1976: 85, 92; Miyamoto 1977: 207; Ishikawa 1999: 25.

This species is characterized by the strong declination of the anteocular portion of the head (Fig. 5), the eyes extending below the level of the ventral surface of the head in lateral view (Fig. 5), the unicolored pronotum (Figs 1, 2), the long fossula spongiosa on each foreleg, 0.4 times as long as the foretibia, and the hemelytron tinged with yellow along the apical margin and on at least the basal third of the corium (Figs 1, 2). The body ranges from 13.7 to 18.0 mm long.

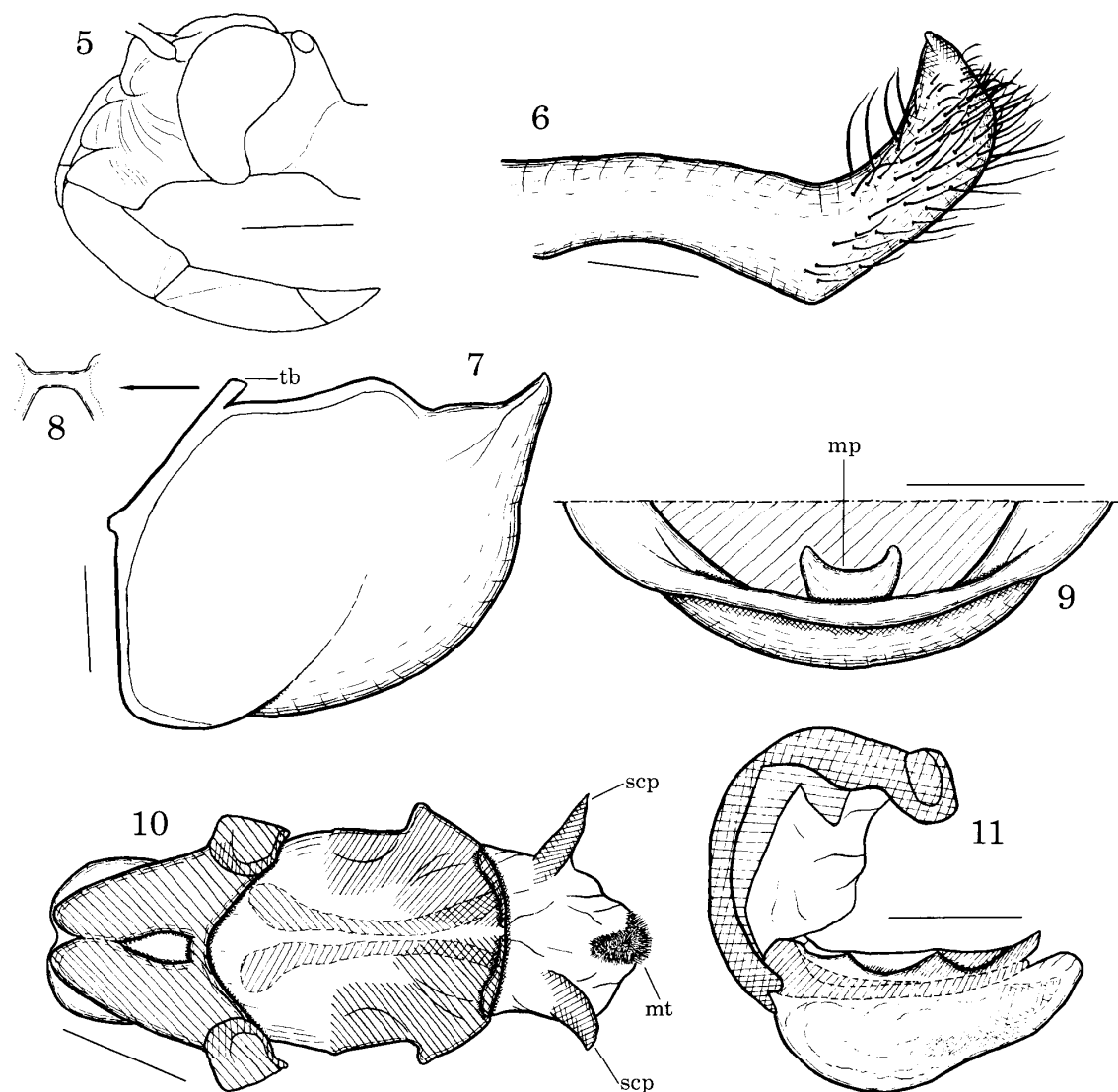
In coloration this species is clearly divisible into two types, tentatively called “type I” (Fig. 1) and “type II” (Fig. 2). The head and thorax are dark brown in type I and blackish in type II; the tibiae are brownish yellow in type I and brown in type II; and each corium is yellowish in the basal third in type I and in the basal half in



Figs 1–4. Habitus of reduviine species. 1, 2, *Reduvius decliviceps* Hsiao, 1976, males, type I from Tsushima Island (1) and type II from Amami-Ōshima Island (2); 3, *Reduvius yaeyamanus* sp. nov., holotype, male, from Iriomote Island; 4, *Tiarodes miyamotoi* sp. nov., holotype, male, from Ishigaki Island. Scales: 5.0 mm.

type II.

Supplementary description of the male genitalia: pygophore (Figs 7–9) with narrow, sclerotized, transverse bridge (Figs 7, 8; tb) dorsobasally; median process (Fig. 9; mp) small, flat transversely, concave dorsally, extending from deep concavity in pygophore and invisible in lateral view (Fig. 7); parameres (Fig. 6) short, inwardly bent at midlength, obtuse at apex, covered with erect setae in apical half; phallus (Figs 10, 11) compressed dorsoventrally; basal plate (Figs 10, 11) stout, with short, narrow bridge; phallosoma (Figs 10, 11) sclerotized dorsally as illustrated, laterally projecting subapically, reflexed upwards along anterodorsal margin; en-



Figs 5–11. *Reduvius decliviceps* Hsiao, 1976, with setae omitted except for Figs 6 and 10. 5, Head, lateral view; 6, left paramere, dorsal view; 7, pygophore, lateral view; 8, transverse bridge of pygophore, dorsal view; 9, apical part of pygophore, posterodorsal view; 10, phallus, with endosoma in everted condition, dorsal view; 11, phallus, with endosoma retracted into phallosoma, lateral view. Abbreviations: mp, median process; mt, microtrichia; scp, sclerotized projection; tb, transverse bridge. Scales: 1.0 mm for Fig. 5; 0.5 mm for Figs 7–11; 0.2 mm for Fig. 6.

dosoma (Fig. 10) densely covered with microtrichia (mt) in apical part, with sclerotized projection (scp) on each side.

Material examined. **Japan.** [Tôkyô] Mt. Takao-san, 1♂ (type I), 23.vii.1933, T. Okada (ELEU). [Izu Islands] Tsubota, Miyake Is., 1♂ (type I; shown in Fig. 11), 13.vii.1964, light trap, S. Tachikawa (TUA); Kamitsuki, Miyake Is., 1♂ (type I), 26.vii.1938, K. Hayasi (NIAES). [Nagano Pref.] Nakaizamurai, Tenryû Village, 1♂ (type I), 18.vii.1985, M. Ihara (NSMT). [Mie Pref.] Hachisu, Iitaka Town, 1♂ (type I), 21.vii.1957, Y. Miwa (NIAES). [Fukuoka Pref.] Mt. Inu-ga-take, Buzen, 1♂ (type I), 13.vii.1988, H. Hori, Kawahara, and K. Yasumatsu (KUEC). [Ôita Pref.] Mt. Sobosan, 1♀ (type I), 27.vii.1940, A. Kira (ELEU); *ditto*, 1♂ (type I), 31.vii.1981, K. Yasumatsu (KUEC). [Kagoshima Pref.] Mt. Kirishima-yama, 1♂ (type I), 25.vii.1935, A. Kira (NIAES). [Tsushima Is.] Mt. Tatera-san, Izuhara Town, 1♂ (type I; shown in Fig. 1), 30.vii.1998, by light trap, T. Ishikawa (TUA); *ditto*, 1♂ (type I), 24–27.vii.1985, H. Makihara (NIAES). [Amami-Ôshima Is.] Shinokawa, Setouchi Town, 1♂ (type II; shown in Figs 2, 5–10), 23.vi.1997, S. Yano (TUA); Hatsuno, Setouchi Town, 1♀ (type II), 8.vii.1962, N. Ohbayashi (ELEU); *ditto*, 1♂ (type II), 12.vii.1962, N. Ohbayashi (ELEU). [Iriomote Is.] Shirahama, 2♂ (type II), 26.v.1973, Y. Kurosawa (NSMT); *ditto*, 1♂ (type II), 30.v.1973, Y. Kurosawa (NSMT).

Distribution. Japan [Honshû (Hasegawa 1960; present study), Kyûshû (Hasegawa 1960; present study), Miyake Is.*, Tsushima Is. (Ishikawa 1999; present study), Amami-Ôshima Is.*, Iriomote Is.*], Korea (Lee *et al.* 1994), E China (Hsiao 1976).

Remarks. The holotype of this species, as well as individuals from Japan proper, China, and Korea, exhibits the color pattern of type I. The specimens from Amami-Ôshima Is. and Iriomote Is. in the Ryûkyû Islands all belong to type II. These two types may represent subspecies, but the available specimens are insufficient to draw a definite conclusion.

In general appearance this species is similar to *Reduvius nigerrimus* Hsiao, 1976, known from China, from which it is distinguishable by the eyes that exceed the level of the ventral surface of the head in lateral view (Fig. 5) (in *R. nigerrimus*, not exceeding this level), antennal segment II being three times as long as segment I (vs. 1.3 times as long as segment I), and the corium being tinged with yellow at least on the basal third (vs. wholly blackish). This species also resembles *Reduvius lateralis* Hsiao, 1976, known from China, but the former is separable from the latter by the strong declination of the anteocular portion of the head (Fig. 5) (in *R. lateralis*, weakly declined), the eyes that exceed the level of the ventral surface of the head in lateral view (Fig. 5) (vs. not exceeding this level), the unicolored posterior pronotal lobe (vs. with red tinge along lateral margins), and the lack of a reddish transverse stripe on each membrane of the hemelytra (vs. with such a stripe).

Biology. Due to the rareness of this species, very little is known of its biology. Ishikawa (1999) collected a male by artificial light set on the forest floor in Tsushima Island and observed the bug flying actively around the light. On the basis of the collecting dates, the adult may be assumed to appear early in summer.

***Reduvius humeralis* (Scott, 1874)**
 [Japanese name: Kubiaka-sashigame]
 (Figs 12, 13, 15, 17, 18)

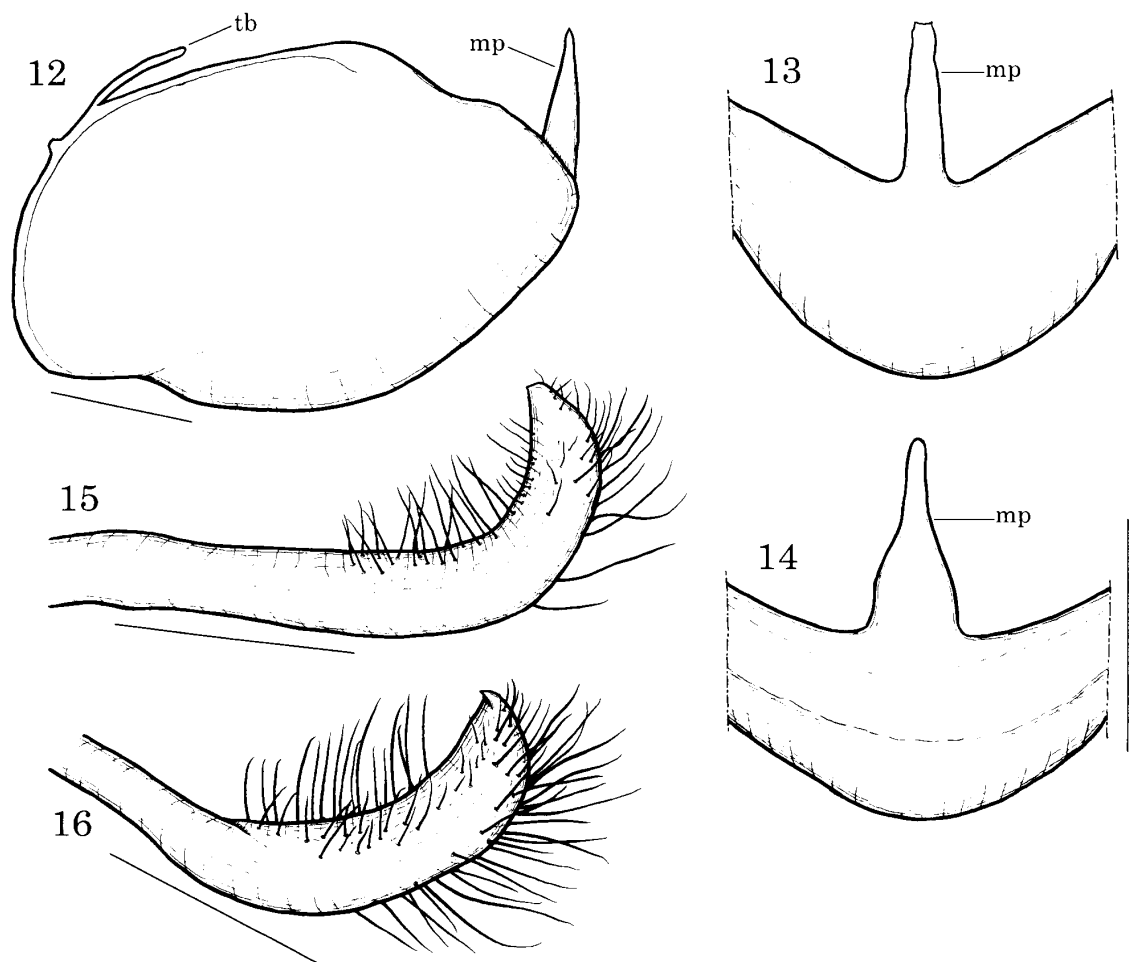
Acanthaspis humeralis Scott, 1874: 444; Fukui 1927: 3.

Reduvius yanoi Fukui, 1927: 2. [Synonymized by Esaki 1927: 177]

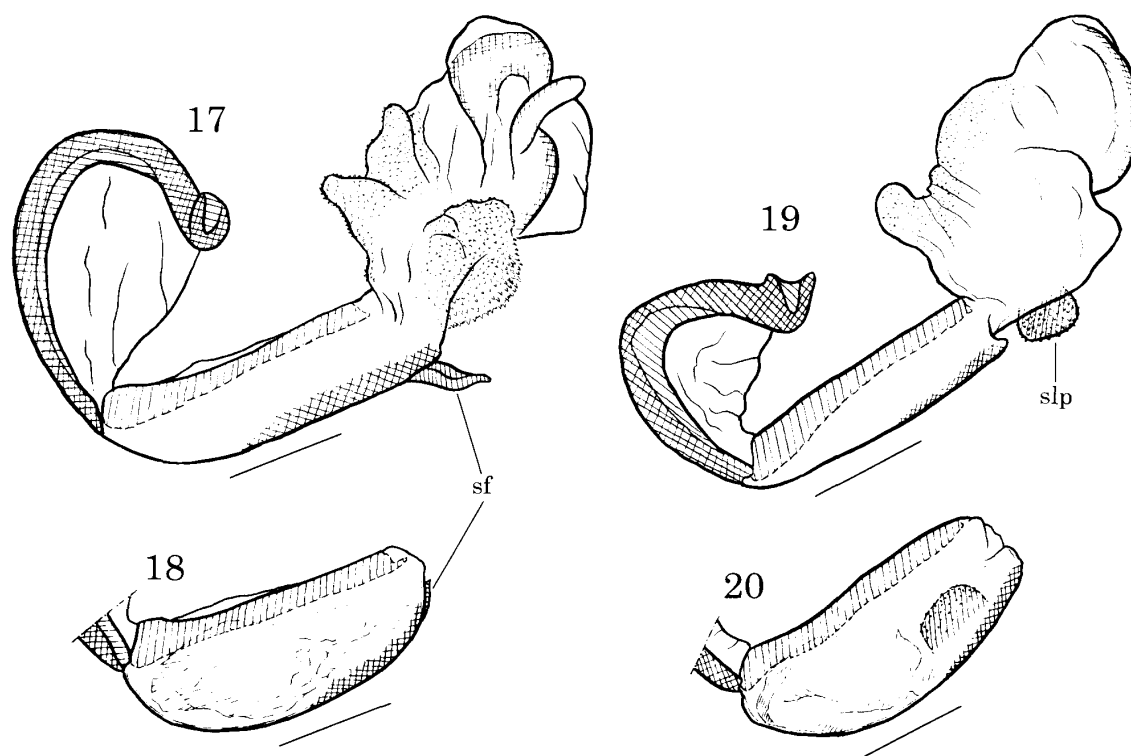
Reduvius humeralis: Esaki 1927: 177; Ishihara 1937: 728; Ookubo 1937: 339; Esaki 1956: 247; Hasegawa 1960: 46; Miyamoto 1965: 93; Yasunaga *et al.* 1993: 30, 171.

This species has the following character states: body and legs black; eyes not reaching level of ventral surface of head in lateral view; posterior pronotal lobe being red with dark marking(s); fossula spongiosa of each foreleg 0.4 times as long as foretibia; hemelytra black with reddish base. The body length ranges from 13.0 to 16.5 mm.

Supplementary description of the male genitalia: pygophore (Fig. 12) with nar-



Figs 12–16. *Reduvius humeralis* (Scott, 1874) (12, 13, 15) and *R. tenebrosus* (Stål, 1863) (14, 16), with setae omitted except for Figs 15 and 16. 12, Pygophore, lateral view; 13, 14, apical part of pygophore, posterior view; 15, 16, left paramere, dorsal view. Abbreviations: mp, median process; tb, transverse bridge. Scales: 0.5 mm.



Figs 17–20. Phalli of *Reduvius humeralis* (Scott, 1874) (17, 18) and *R. tenebrosus* (Stål, 1863) (19, 20), lateral view. 17, 19, Endosoma in everted condition; 18, 20, endosoma retracted into phallosoma. Abbreviations: sf, sclerotized foliole; slp, sack-like projection. Scales: 0.5 mm.

row, sclerotized, transverse bridge (tb) dorsobasally; median process (Figs 12, 13; mp) erect, slightly and evenly narrowing apicad and truncate at apex in posterior view; parameres (Fig. 15) strongly curved inward in apical part, obtuse at apex, covered with erect setae in apical half; phallus (Figs 17, 18) compressed dorsoventrally; phallosoma (Figs 17, 18) with sclerotized foliole (sf) ventroapically; endosoma (Fig. 17) membranous, but minutely roughened for the most part.

Material examined. **Japan.** [Iwate Pref.] near Takayashiki, Sumita Town, 1♀, 7–8.viii.2001, T. Tsuru (TUA). [Niigata Pref.] Mt. Myōkō-san, 1♀, 21.vi.1963, H. Satoya (TUA). [Gumma Pref.] Tokura, Katashina Village, 1♀, 13.vii.1950, H. Hasegawa (NIAES); Minakami Town, 1♀, 3.vii.1963, K. Takahashi (NIAES). [Saitama Pref.] Akaiwa Pass, Okuchichibu, Ōtaki Village, 1♀, 7.viii.1951, I. Fujiyama (NIAES). [Tōkyō] Mt. Mitake, 1♂, 31.vii.1965, M. Sawada (TUA); Nippara, Okutama Town, 1♀, 13.vii.1952, T. Fujimura (NIAES); *ditto*, 1♀, 12.vii.1986, M. Tomokuni (NSMT). [Kanagawa Pref.] Mt. Tanzawa-san, 1♀, 20.vi.1962, H. Takenaka (TUA); Yakushi Forest Road, Nanasawa, Atsugi, 2♀, 16.vi.2004, T. Ishikawa (TUA). [Yamanashi Pref.] Kanayama, Sutama Town, 1♀, 18.vii.1963, A. Kato (TUA); Kuro-mori Spa, Sutama Town, 1♀, 19.vii.1999, Y. Nakatani (TUA). [Nagano Pref.] Tokura Town, 1♂, 6.vii.1951, S. Asahina (NSMT); Shimajimadani, Azumi Village, 1♀, 6.viii.1993, T. Aoki and S. Yamaguchi (CAU). [Ishikawa Pref.] Mt. Haku-san, 9.viii.1970, M. Tomokuni (NSMT). [Gifu Pref.] Fushimi, Hida, 1♀, 25.vii.1968, M. Sato (NSMT). [Mie Pref.] Hirakura, Iitaka Town, 1♀, 3.vii.1957, K. Mizusawa (TUA). [Nara Pref.] Ikeana, Totsukawa Village, 1♂, 5.vi.1996, S. Gotoh (TUA). [Wakayama

Pref.] Mt. Ôkurabata-yama, Kumanogawa Town, 1♂, 30.v.1994, S. Gotoh (TUA); Minamihizue, Shingû, 1♀, 17.vi.1997, Y. Nakatani (TUA); Kashiya, Kozagawa Town, 2♂, 3.vi.1994, S. Gotoh (TUA); Mt. Ôtô-san, 2♂, 24.vi.1997, S. Gotoh (TUA). [Okayama Pref.] Mt. Gagyû-zan, Takahashi, 16.vi.1988, T. Aono (KURA). [Kagawa Pref.] Mt. Ôtaki-san, 1♂, 18.vii.1963, M. Yasukawa (TUA). [Tokushima Pref.] Mt. Takashiro-yama, Naka County, 1♀, 29.vii.1979, M. Yoshida (NSMT). [Ehime Pref.] Namakusa-dani, Mt. Oda-miyama, 1♀, 21.vi.1994, M. Tomokuni (NSMT). [Fukuoka Pref.] Mt. Wakasugi-yama, 1♂, 20–21.vi.1933, H. Hori, M. Fujino, and K. Yasumatsu (KUEC); Mt. Inu-ga-take, 1♀, 13.vii.1938, H. Hori, Kawahara, and K. Yasumatsu (KUEC); Mt. Hôman-san, 10.vi.1930, T. Esaki, H. Hori, M. Fujino, and Hashimoto (KUEC); Mt. Hiko-san, 1♂, 1♀, 18.vii.1940, H. Inoue (NIAES). [Ôita Pref.] Mt. Sobosan, 1♀, 26.vii.1937, N. Yamaguchi (NIAES); *ditto*, 1♀, 1.viii.1981, K. Yasumatsu (KUEC); Kujû, Naoiri County, 1♂, 14.vii.1996, T. Yamauchi (TUA); Kokonoe Town, 1♂ (shown in Figs 12, 13, 15, 17), 1♀, 20.vii.2002, H. Yoshitake (TUA); *ditto*, 1♂ (shown in Fig. 18), 20–21.vii.2002, T. Mizusawa (TUA). [Kagoshima Pref.] Mt. Kurino-dake, 1♀, 28.vii.1974, M. Sakai (NSMT); Uchinono, Matsuyama Town, 1♀, 3.vi.1964, M. Saikawa (TUA). [Koshiki Islands] Aose, Shimokoshiki Is., 1♂, 26.v.1975, Y. Watanabe (TUA); Sebi, Shimokoshiki Is., 1♀, 28.v.1975, Y. Watababe (TUA); Mt. Kuchi-dake, Shimokoshiki Is., 1♂, 28.v.1975, K. Yoshida (TUA). [Amami-Ôshima Is.] Yakkachi, Sumiyô Village, 1♀, 17.vii.1933, T. Esaki and K. Yasumatsu (KUEC); Shinokawa, Setouchi Town, 1♀, 23.vi.1997, S. Yano (OMM).

Comparative material examined of *Reduvius tenebrosus* (Stål, 1863). **China.** Damingshan, Wuwu, Guangxi, 1♂ (shown in Fig. 20), 22.v.1963 (NSMT). **Taiwan** (new record). Kantozan, Hori, Nantou County, 1♂, 1♀, 11.v.1987 (TUA); 4♂, 2♀, 13.v.1987 (TUA); Nanshanchi, Nantou County, 1♀, 12.iv.1991, K. La (TUA); Kukuan, Taichung County, 1♂ (shown in Figs 14, 16, 19), 11.iv.1991, K. La (TUA).

Distribution. Japan (Scott 1874) [Honshû (Fukui 1927; present study), Shikoku (Ookubo 1937; present study), Kyûshû (Fukui 1927; present study), Koshiki Islands*, Amami-Ôshima Is.*].

Remarks. In general habitus this species is very similar to *Reduvius tenebrosus* (Figs 14, 16, 19, 20), described from China (see Stål 1863), and Kerzhner (1992) suggested a possible synonymy between these species. However, *Reduvius humeralis* is separable from *R. tenebrosus* by the red posterior pronotal lobe with a dark marking or markings (in *R. tenebrosus*, wholly orange), the reddish bases of the otherwise black hemelytra (vs. wholly black, sometimes tinged with orange only on the extreme bases), the median process of the pygophore being slightly and evenly narrowed apicad and truncate at its apex in posterior view (Fig. 13) (vs. distinctly widened in the basal half and rounded at the apex in posterior view; Fig. 14; mp), the parameres being curved only apically (Fig. 15) (vs. evenly curved inward; Fig. 16), and the lack of a sclerotized, sack-like projection covered by fine teeth on the endosoma of the phallus (Fig. 17) (vs. the presence ventrobasally of a sclerotized, sack-like projection (slp) wholly covered by fine teeth; Fig. 19). These morphological differences indicate that these two forms should be regarded as distinct species.

Biology. This species is the most common reduviine in Japan. It has been found in bushes and on fagaceous trees such as *Quercus serrata* Thunb. ex Murray and *Q. acutissima* Carruthers in montane areas as noted by Esaki (1956), Miyamoto (1965), and Yasunaga *et al.* (1993).

***Reduvius yaeyamanus* sp. n.**

[New Japanese name: Semadara-sashigame]

(Figs 3, 21–30)

Diagnosis. This species is easily recognized by the following combination of character states: body orange (Fig. 3); head and pronotum covered with long, erect setae; eyes not reaching level of ventral surface of head in lateral view (Fig. 21); femora dark brown; tibiae brownish yellow with dark bases and apices; fossula spongiosa of foreleg 0.45 times as long as foretibia; hemelytra orange with dark clavi and three dark spots on each membrane (Fig. 3); median process of pygophore wedge-shaped in posterior view (Fig. 24); endosoma of phallus with sclerotized, sack-like projection dorsobasally (Fig. 26).

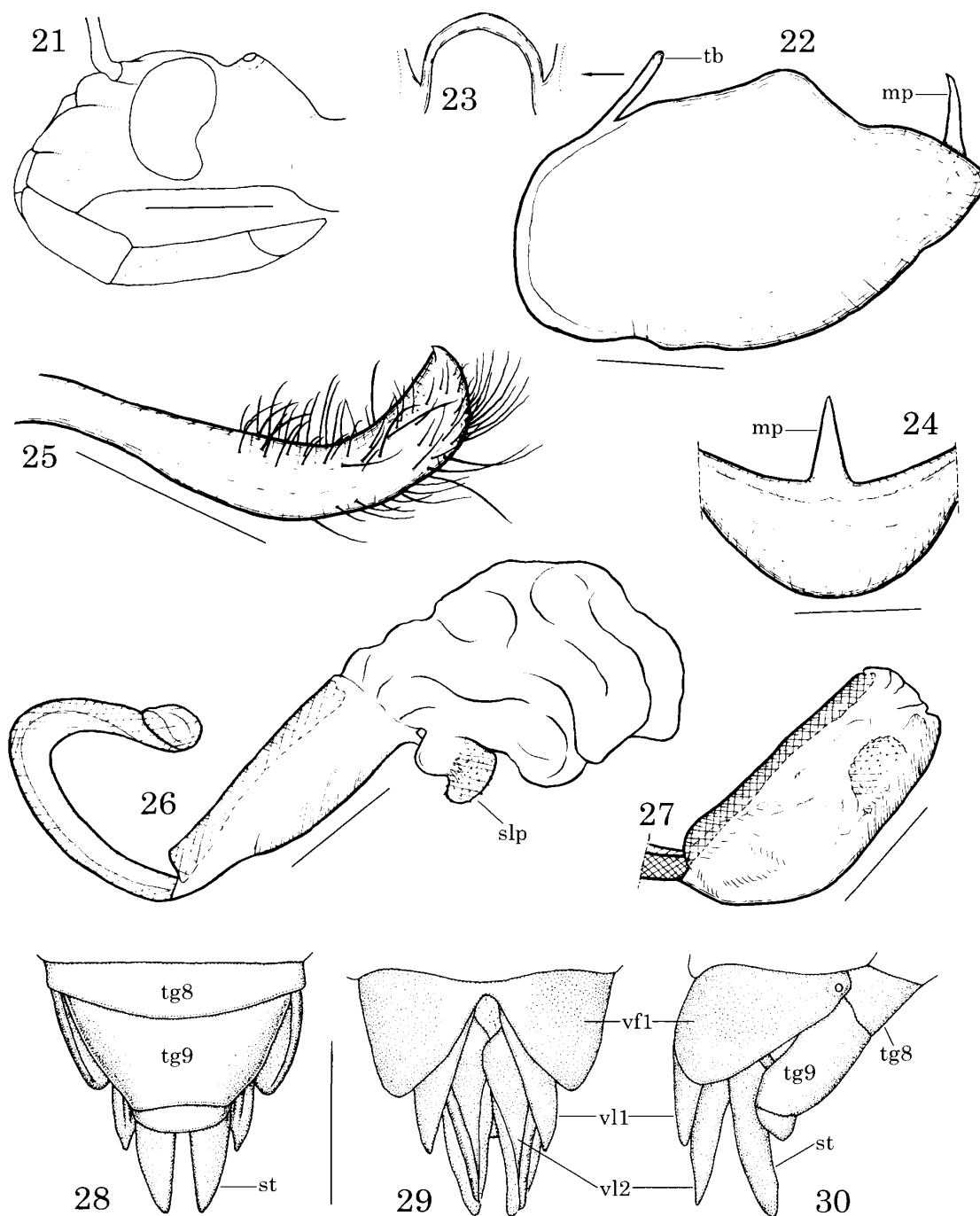
Description. *Male (holotype).* Body mostly orange (Fig. 3). Anterior pronotal lobe somewhat darker than posterior lobe. Rostral segments I and II on their inner surfaces, as well as antennae, femora, and tarsi dark brown to black. Coxae and trochanters orange, each with dark markings. Tibiae brownish yellow, darkened on bases and apices. Hemelytra (Fig. 3) orange, each with two dark spots on postcubital (inner) cell and one dark spot on cubital (outer) cell. Clavi dark; corium with dark longitudinal area between Cu and Pcu.

Head (Fig. 21) 1.6 times as long as width across eyes, slightly longer than pronotum, furnished with long, erect setae; antecular portion weakly rugose, 0.8 times as long as postocular portion. Eyes about 0.9 times as wide as interocular space in dorsal view, not reaching level of ventral surface of head in lateral view (Fig. 21). Antennae covered with erect and suberect setae; proportional lengths of segments I to IV 1.1:1.6:1.3:1.0. Rostrum covered with long, suberect setae; proportional lengths of segments I to III 2:3:1.

Pronotum furnished with long, erect setae; collar convex along anterior margin; anterior lobe 0.55 times as long as posterior lobe, with median longitudinal sulcus throughout; posterior lobe transversely rugose, rounded at humeral angles, gently convex along posterior margin, with broad median depression. Scutellum coarsely rugose, carinate along lateral margins, with apical spine curved upward and obtuse at tip. Legs densely covered with long, erect setae; fossulae spongiosa on fore- and midlegs 0.45 and 0.38 times as long as respective tibia. Hemelytra covered with suberect, curved setae on coria, exceeding apex of abdomen. Abdomen densely covered with suberect or decumbent long setae.

Genital structure of paratypes. Pygophore (Figs 22–24) with narrow, sclerotized, transverse bridge (tb) dorsobasally; median process (Figs 22, 24; mp) erect, wedge-shaped, slightly curved apically in lateral view, with acute tip. Parameres (Fig. 25) curved inward in apical third, acute at apices, covered with setae of variable length. Phallus (Figs 26, 27) with large basal plate; endosoma (Fig. 26) membranous, dorsobasally, with sclerotized, sack-like projection (slp) entirely covered with fine teeth.

Female (paratype). Almost same in general habitus as male. Head 1.7 times as long as width across eyes. Eyes about 0.7 times as wide as interocular space in dorsal view. Proportional lengths of antennal segments I to IV 1.0:1.4:1.3:1.0. Abdominal tergite IX (Figs 28, 30; tg9) smooth, trapezoidal in dorsal view, with posterior margin weakly concave; valvifer I (Figs 29, 30; vf1) with distal margin rounded;



Figs 21–30. *Reduvius yaeyamanus* sp. nov., holotype (21), male paratypes (22–27), and female paratype (28–30), with setae omitted except for Fig. 25. 21, Head, lateral view; 22, pygophore, lateral view; 23, transverse bridge, dorsal view; 24, posterior part of pygophore, posterior view; 25, left paramere, dorsal view; 26, phallus, with endosoma in everted condition, lateral view; 27, phallus, with endosoma retracted into phallosoma, lateral view; 28–30, apical part of abdomen, dorsal (28), ventral (29), and left-lateral (30) views. Abbreviations: mp, median process; slp, sack-like projection; st, styloides; tb, transverse bridge; tg8, abdominal tergite VIII; tg9, abdominal tergite IX; vf1, valvifer I; vl1, valvula I; vl2, valvula II. Scales: 1.0 mm for Figs 21, 28–30; 0.5 mm for Figs 22–27.

valvula I (Figs 29, 30; vl1) narrow, obtuse at apex; valvula II (Figs 29, 30; vl2) with acute tip; styloides (Figs 28, 30; st) long, blunt at apex.

Measurements [in mm, ♂ (n=27) / ♀ (n=7), holotype in parentheses]. Body length 14.00–16.50/16.20–17.80 (15.00). Head length 2.48–2.87/2.65–2.91 (2.50), width across eyes 1.56–1.73/1.57–1.75 (1.60); length of anteocular portion 0.84–0.97/0.92–1.09 (0.96), of postocular portion 1.01–1.32/1.00–1.33 (1.22). Antenna length 10.61–12.11/10.39–11.36 (11.18); lengths of segments I to IV 2.35–2.66/2.33–2.49 (2.42), 3.18–3.85/3.15–3.47 (3.63), 2.92–3.19/2.86–3.07 (2.99), and 2.16–2.41/2.05–2.33 (2.33), respectively. Rostrum length 2.74–3.02/2.79–3.24 (2.79); lengths of segments I to III 0.98–1.05/0.98–1.15 (0.99), 1.34–1.46/1.35–1.57 (1.34), and 0.42–0.51/0.46–0.52 (0.46), respectively. Pronotum length 2.35–2.94/2.68–2.99 (2.43), width across humeri 3.06–3.79/3.50–3.93 (3.32); length of anterior lobe 0.96–1.02/0.94–1.12 (0.97), of posterior lobe 1.36–1.82/1.59–1.78 (1.50). Hemelytron length 10.90–12.00/11.80–13.00 (11.80). Lengths of femur, tibia, and tarsus of foreleg 4.17–5.00/4.30–4.88 (4.43), 3.87–4.68/4.00–4.43 (4.18), and 1.26–1.38/1.29–1.47 (1.33), respectively; of midleg 3.87–4.25/4.10–4.75 (4.25), 3.80–4.50/3.95–4.58 (4.13), and 1.26–1.45/1.40–1.54 (1.35), respectively; of hindleg 6.16–7.00/6.33–7.15 (6.50), 6.90–8.00/7.10–7.85 (7.08), and 2.10–2.36/2.14–2.28 (2.17), respectively. Abdomen length 7.35–8.85/9.15–9.90 (8.15), maximum width 3.64–4.75/4.35–5.00 (4.43).

Type material. Holotype: ♂ (NSMT-I-He 4700, shown in Figs 3, 21), “[Japan] Sumiyoshi, Iriomote Is., The Ryukyus, 16. V. 2001, T. Tsuru leg.” (NSMT). Paratypes: **Japan.** [Ishigaki Is.] Mt. Yarabu-dake, 8♂ (one shown in Figs 22–26, other in Fig. 27), 5.v.2002, T. Nakata (TUA); *ditto*, 1♂, 8.vi.2002, by box light trap, S. Nagashima (TUA); *ditto*, 1♂ (NSMT-I-He 4701), 19.iv.1998, K. Takahashi (NSMT); Yoshihara, 1♀, 8.v.1999, by light trap, T. Shimada (TUA); Yonehara, 1♂, 26.v.2001, T. Shimada (TUA); Nakasuji-mitake, 1♂, 8.v.1999, T. Shimada (CAU); Mt. Nosoko-dake, 2♂, 24.v.2001, by light trap, T. Tsuru (TUA); Takeda Forest Road, 2♂, 15.v.2002, by light trap, K. Yamada (TUA); Mt. Omoto-dake, 3♂, 15.vi.2002, T. Nakata (TUA); *ditto*, 1♂, 4.vi.2003, S. Nagashima (TUA); Omoto, 2♂, 5.vi.2003, by light trap, S. Nagashima (TUA); Arakawa, 1♀, 30.v.1973, J. Okuma (NIAES); detailed locality not given, 1♂, vii.1938, Ohshima and Ikeda (KUEC); 1 ex. (body badly damaged and abdomen lost), 9.iv.1916, M. Yano (NIAES). [Iriomote Is.] Shirahama, 1♂, 25.v.2003, by box light trap, T. Tsuru (TUA); Sumiyoshi, 1♂, 7.v.2001, T. Tsuru (TUA); *ditto*, 2♀, 16–17.v.2001, T. Shimada (TUA); *ditto*, 1♀, 8.vi.2002, at light, T. Ishikawa (TUA); Uehara, 1♀ (NSMT-I-He 4702), 19.v.1984, S. Asahina (NSMT); *ditto*, 1♂, 29.iv.1998, K. Toyoda (TUA); *ditto*, 1♀ (shown in Figs 28–30), 8.vi.2002, at light, T. Ishikawa (TUA).

Distribution. Japan [Ryūkyū Islands (Ishigaki Is., Iriomote Is.).]

Remarks. In general habitus this new species resembles *Reduvius fasciatus lui* Cai and Shen, 1997 (*q.v.*), known from China. It can be distinguished from the latter by the orange to dark coloration of the head, anterior pronotal lobe, and scutellum (Fig. 3) (in *R. fasciatus lui*, blackish); the narrower head, about 1.6 times as long as width across the eyes (vs. about 1.8 times); and the shorter antennal segment II, about 1.5 times as long as segment I (vs. about 1.7 times). At a glance, this new species is also similar to *Reduvius nigrorufus* Hsiao, 1976 (*q.v.*), known from China. It is separable from the latter in the coloration of the head, anterior pronotal lobe, and scutellum (Fig. 3) (in *R. nigrorufus*, blackish) and the hairier head and pronotum, which are covered with long, erect setae (vs. short setae).

Biology. The examined specimens were mostly collected by artificial light. Nakata (pers. comm.) found a male on a leaf of *Alocasia odora* K. Koch (Araceae) in Ishigaki Island. No further information is available on its biology.

Etymology. The specific name is based on the name of the island group that includes Iriomote and Ishigaki Islands; an adjective.

Genus *Tiarodes* Burmeister, 1835

Tiarodes miyamotoi sp. n.

[New Japanese name: Monki-hirata-sashigame]

(Figs 4, 31–40)

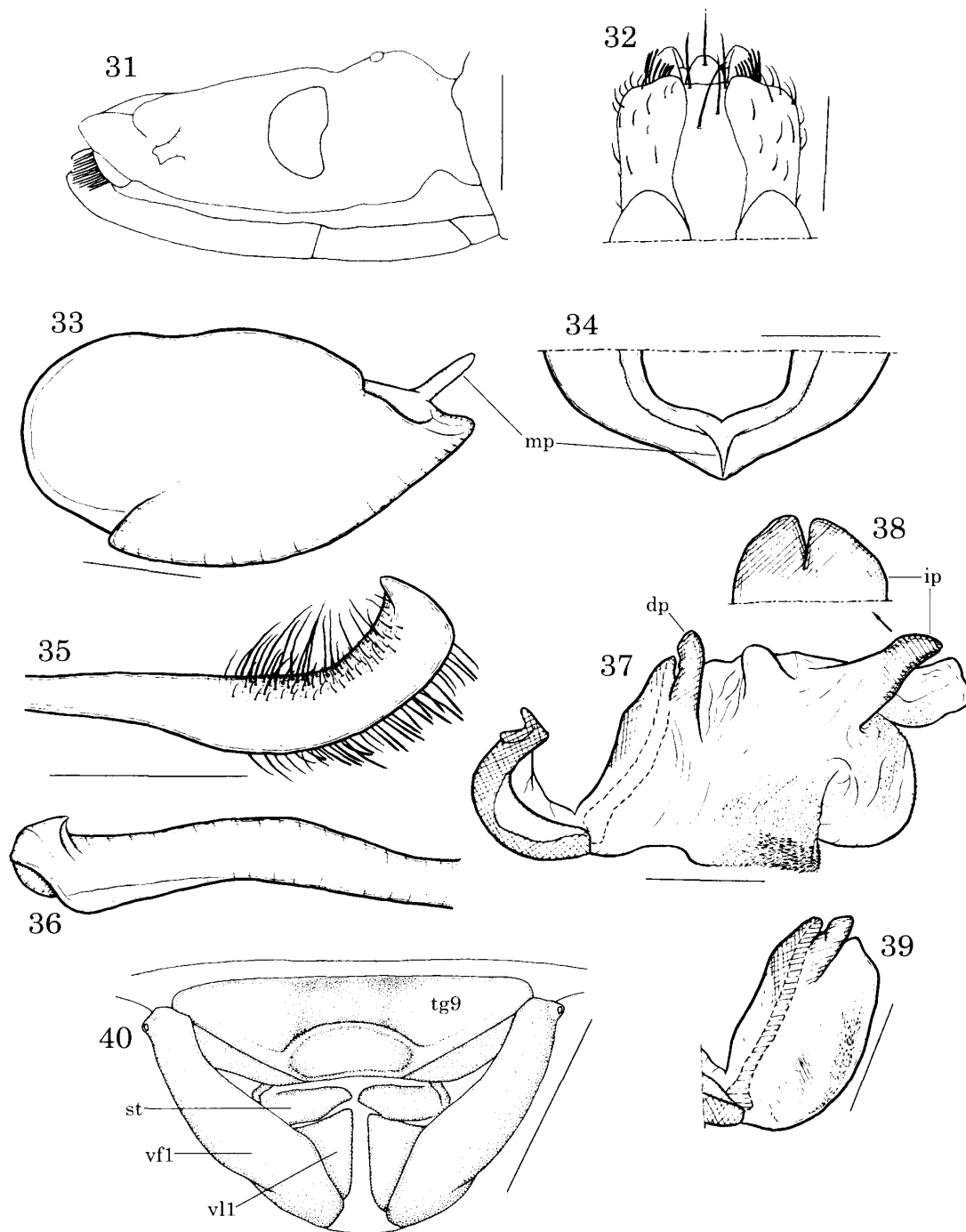
Diagnosis. This species is recognized by the following combination of character states: body 15 to 20 mm long; corium with one large, yellow spot (Fig. 4); head red with irregular black markings; venter of abdomen red, with sternite II and anterior margins of sternites III to VII blackish; parameres longitudinally carinate ventrally in apical half (Fig. 36).

Description. *Male (holotype).* Head red with irregular black markings; antenniferous tubercles black; antennae dark, with segments I to III pale at bases and apices. Pronotal collar black; anterior pronotal lobe red; posterior pronotal lobe dark red. Meso- and metathoraces black, weakly tinged with red on supracoxal areas. Legs red, darkened on apices of femora and both ends of tibiae, with dark markings on coxae and trochanters; tarsi brownish yellow. Hemelytra (Fig. 4) black, with one large, yellow spot on each corium. Abdominal sternites red except for expanses of black on segment II; sternites III to VII darkened along anterior margin; laterotergite II black, III to VII red.

Head (Figs 31, 32) furnished with short, decumbent setae throughout and several long, erect setae anteriorly (Fig. 32); anteocular portion weakly wrinkled, 1.5 times as long as postocular portion, parallel-sided in dorsal view between antenniferous tubercles and eyes; mandibular plates surpassing apex of anteclypeus (Fig. 32). Eyes about 0.35 times as wide as interocular space in dorsal view. Antennae short; segment I sparsely covered with short, decumbent setae, segments II to IV with long, erect setae; segment II more than twice as long as segment III; length proportions of segments I to IV 1.0: 5.0: 2.3: 1.8. Rostrum sparsely covered with short, decumbent setae; segment I longer than remaining segments combined; length proportions of segments I to III 3.1: 1.9: 1.0.

Pronotum sparsely covered with short, decumbent setae; collar well developed, roundly projecting on both sides; anterior lobe 0.7 times as long as posterior lobe; posterior lobe rounded at humeral angles, gently convex along posterior margin, with broad median depression. Scutellum depressed discally, with apex obtuse. Forefemur about 4.5 times as long as its maximum width; fossula spongiosa of foreleg 0.25 times as long as foretibia. Hemelytra sparsely covered with short, decumbent setae on coria, well exceeding apex of abdomen.

Genital structure of paratypes. Pygophore (Figs 33, 34) weakly compressed dorsoventrally; median process (Figs 33, 34; mp) obliquely projecting posteriad, with apex rounded in lateral view (Fig. 33), acute in dorsal view (Fig. 34). Parameres (Figs 35, 36) gently curved inward, hooked and obtuse at apex, longitudinally carinate ventrally in apical half (Fig. 36), covered with setae on inner and



Figs 31–40. *Tiarodes miyamotoi* sp. nov., holotype (31, 32), male paratypes (33–39), and female paratype (40), with setae omitted except for Figs 32 and 35. 31, Head, lateral view; 32, apical part of head, dorsal view; 33, pygophore, lateral view; 34, apical part of pygophore, dorsal view; 35, 36, left paramere, dorsal (35) and inner (36) views; 37, phallus, with endosoma in everted condition, lateral view; 38, deeply incised sclerotized process, dorsal view; 39, phallus, with endosoma retracted into phallosoma, lateral view; 40, apical part of abdomen, posterior view. Abbreviations: dp, dorsobasal sclerotized process; ip, deeply incised sclerotized process; mp, median process; st, styloides; tg9, abdominal tergite IX; vfl, valvifer I; vl1, valvula I. Scales: 1.0 mm for Figs 31, 40; 0.5 mm for Figs 32–39.

outer surfaces, most setae on outer surface flattened and somewhat widened subapically (Fig. 35). Phallus (Figs 37–39) stout and thick; endosoma (Figs 37, 38) membranous, with minute spines of variable length, deeply incised sclerotized process (ip) dorsoapically, and pair of dorsobasal sclerotized processes (dp).

Female (paratype). Almost same in general habitus as male. Body slightly larger than in male. Eyes about 0.27 times as wide as interocular space in dorsal view. Antennae slightly shorter than in male; segment II less than twice as long as segment III; length proportions of segments I to IV 1.0: 3.5: 2.0: 1.5. Anterior pronotal lobe 0.9 times as long as posterior lobe. Abdominal tergite IX (Fig. 40; tg9) strongly depressed discally, with curved, transverse, subapical carina; valvifer I (Fig. 40; vf1) with weakly sinuate posterior margin; valvula I (Fig. 40; vl1) short, obtuse at apex; styloides (Fig. 40; st) with blunt tip.

Measurements [in mm, ♂ (n=12) / ♀ (n=10), holotype in parentheses]. Body length 15.00–18.00/16.50–20.00 (16.10). Head length 3.42–3.68/3.78–4.20 (3.45), width across eyes 1.63–1.90/1.78–1.99 (1.70); length of anteocular portion 1.69–1.82/1.91–2.10 (1.73), of postocular portion 1.10–1.33/1.30–1.47 (1.15). Antenna length 5.73–6.53/5.38–5.77 (5.89); lengths of segments I to IV 0.63–0.71/0.70–0.77 (0.66), 2.77–3.20/2.29–2.44 (2.92), 1.26–1.46/1.30–1.37 (1.35), and 0.96–1.16/1.09–1.19 (0.96), respectively. Rostrum length 3.95–4.32/4.46–4.76 (4.14); lengths of segments I to III 2.00–2.19/2.26–2.44 (2.15), 1.28–1.42/1.46–1.57 (1.33), and 0.66–0.71/0.74–0.75 (0.67), respectively. Pronotum length 3.17–3.70/3.38–4.05 (3.30), width across humeri 3.78–4.68/4.08–5.03 (4.03); length of anterior lobe 1.36–1.51/1.63–1.77 (1.36), of posterior lobe 1.69–2.08/1.69–2.14 (1.85). Hemelytron length 9.85–11.40/10.60–11.75 (10.50). Lengths of femur, tibia, and tarsus of foreleg 3.58–3.86/3.88–4.20 (3.66), 3.44–3.82/3.84–4.00 (3.60), and 1.12–1.20/1.19–1.25 (1.20), respectively; of midleg 3.44–3.88/3.78–4.18 (3.52), 3.18–3.58/3.52–3.84 (3.30), and 1.23–1.28/1.23–1.39 (1.24), respectively; of hindleg 4.60–5.33/5.00–5.60 (4.83), 4.88–5.43/5.43–5.90 (5.10), and 1.33–1.48/1.46–1.59 (1.44), respectively. Abdomen length 7.32–8.60/8.45–10.15 (7.32), maximum width 4.75–6.17/6.10–7.15 (5.23).

Type material. Holotype: ♂ (NSMT-I-He 4703, shown in Figs 4, 31, 32), “[Japan] Mt. Omoto-dake, Ishigaki Is., The Ryukyus, 6. VI. 2003, T. Tsuru leg.” (NSMT). Paratypes: **Japan.** [Ishigaki Is.] Mt. Yarabu-dake, 4♀, 11.vii.2000, T. Nakata (TUA); *ditto*, 5♀ (one shown in Fig. 40), 19.vii.2000, T. Nakata (TUA); Kabira, 1♂ (shown in Fig. 39), 5.vi.1986, T. Gotoh (TUA); Mt. Omoto-dake, 1♂ (NSMT-I-He 4704), 2.vi.1973, Y. Kurosawa (NSMT); Mt. Banna-dake, 1♂ (NSMT-I-He 4705), 3.vi.1979, M. Yoshida (NSMT). [Iriomote Is.] Shirahama Forest Road, 1♂ (shown in Figs 35, 36), 12.vi.2002, T. Tsuru (TUA); *ditto*, 1♂ (shown in Figs 37, 38), 30.v.2003, S. Nagashima (TUA); Shirahama, 1♂, 31.v.2003, S. Nagashima (TUA); Sonai, 1♂ (shown in Figs 33, 34), 27.v.2003, T. Tsuru (TUA); Ōtomi Forest Road, 1♂ (NSMT-I-He 4706), 19.v.1984, S. Asahina (NSMT); Mt. Goza-dake, 3♂, 1♀, 31.v.1974, J. Okuma (NIAES).

Distribution. Japan [Ryūkyū Islands (Ishigaki Is., Iriomote Is.)]. This species is the first representative of the genus *Tiarodes* to be recorded from Japan.

Remarks. Miller (1959) divided the genus *Tiarodes* into four species groups on the basis of external morphology: the *nigrirostris*-, *waterstradti*-, *cruentus*-, and *versicolor*-groups. This new species apparently belongs to the *versicolor*-group, which is defined mainly by the laterally prominent prosternum, the absence of a median sulcus on the mesosternum and a median carina on the meso- and metasterna, and the fossula spongiosa of the foreleg being about one-fourth the

length of the foretibia.

In general habitus this new species is most similar to *Tiarodes pictus* Cai and Tomokuni, 2001, described from Taiwan (Cai *et al.* 2001). It can be distinguished from the latter by the following combination of character states: head longer than pronotum (in *T. pictus*, as long as or shorter than pronotum); collar well developed and distinctly projecting on both sides (vs. weakly developed and indistinctly projecting); abdominal sternites narrowly darkened along anterior margins of segments III to VII (vs. broadly darkened on both sides of sternites III to VII); and parameres longitudinally carinate ventrally in each apical half (Fig. 36) (vs. ecarinate ventrally, only with pointed denticle near apex).

Biology. *Tiarodes miyamotoi* has often been seen flying in deep, moist forests in the Ryûkyû Islands. Nakata (pers. comm.) observed an adult sucking a stag beetle (Lucanidae) in Ishigaki Island.

Etymology. The specific name is dedicated to Dr Syôiti Miyamoto for his remarkable contributions to heteropterology in Japan.

Key to the genera and species of Japanese Reduviinae

1. Body compressed dorsoventrally; head cylindrical; rostrum slender, almost straight (*Tiarodes*) *Tiarodes miyamotoi* sp. n.
- Body not compressed dorsoventrally; head fusiform; rostrum stout, evenly curved 2
2. Mandibular plates strongly projecting anteriad, exceeding anterior margin of clypeus; antennal segment I much shorter than head width across eyes (*Peregrinator*) *Peregrinator biannulipes*
- Mandibular plates not projecting anteriad, not exceeding anterior margin of clypeus; antennal segment I as long as or longer than head width across eyes .. 3
3. Rostral segment I as long as segment II; anterior pronotal lobe deeply sculptured (*Acanthaspis*) *Acanthaspis cincticrus*
- Rostral segment I distinctly shorter than segment II; anterior pronotal lobe shallowly sculptured at most (*Reduvius*) 4
4. Eyes exceeding level of ventral margin of head in lateral view; antennal segment I shorter than half length of segment II *R. decliviceps*
- Eyes not exceeding level of ventral margin of head in lateral view; antennal segment I longer than half length of segment II 5
5. Hemelytra black with red base; tibiae wholly black *R. humeralis*
- Hemelytra orange with dark spots; tibiae brownish yellow, with dark basal and apical parts *R. yaeyamanus* sp. n.

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